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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,769	12/02/2003	Stuart M. Lindsay	10060298-2	3836

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EXAMINER	
LIVEDALEN, BRIAN J	
ART UNIT	**PAPER NUMBER**
2878	

NOTIFICATION DATE	DELIVERY MODE
01/07/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPOPS.LEGAL@agilent.com

Office Action Summary	Application No.	Applicant(s)	
	10/725,769	LINDSAY ET AL.	
	Examiner	Art Unit	
	Brian J. Livedalen	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/3/2007 has been entered. Claims 1-13 and 15 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 4, 12, and 13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The above claims recite the limitation, "said scanning probe microscope is a fast atomic force microscope (AFM) with a resonance frequency between about 250 Hz to about 7.5 kHz." The range of about 250 Hz to about 7.5 kHz is not supported in the specification. The specification only discloses one value (2.8 kHz) in the claimed range but does not provide support for the rest of the range. Correction is required.

Claims 3, 5-11, and 15 inherit the problems from the claims of which they depend.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440, see English translation) in view of Watanabe et al. (5371365) and in further view of Barrett (5210410).

In regard to claims 1 and 12, Funakubo discloses (fig. 1) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the stage fast scanning stage comprising, at least one fixed support (19), and a sample stage (17) having at least one axis of translation, the sample stage being affixed to the at least one fixed support by means for causing displacement (18) of the sample stage relative to the probe (page 6, lines 14-34). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in

the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the system of Funakubo in an atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. Funakubo in view of Watanabe fails to disclose that the resonant frequency of the microscope is between about 250 Hz and 7.5 kHz. However, Barrett discloses an atomic force microscope with a resonant frequency between about 250 Hz and 7.5 kHz (column 1, lines 15-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the resonant frequency of the microscope of Funakubo in view of Watanabe to be between about 250 Hz and 7.5 kHz as taught by Barrett, in order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response.

In regard to claim 2, Funakubo discloses (fig. 1) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the stage fast scanning stage comprising, at least one fixed support (19), and a sample stage (17) having at least one axis of translation, the sample stage being affixed to the at least one fixed support by means for causing displacement (18) of the sample stage relative to the probe (page 6, lines 14-34); and in which the means for

causing displacement of the sample include at least one actuator element (18) supporting the stage and a sine waveform generator (fig. 4, 62) for actuating the at least one actuator element (page 5, lines 4-10; page 6, lines 1-3; page 7, lines 19-36; page 9, lines 16-28). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the system of Funakubo in an atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. Funakubo in view of Watanabe fails to disclose that the resonant frequency of the microscope is between about 250 Hz and 7.5 kHz. However, Barrett discloses an atomic force microscope with a resonant frequency between about 250 Hz and 7.5 kHz (column 1, lines 15-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the resonant frequency of the microscope of Funakubo in view of Watanabe to be between about 250 Hz and 7.5 kHz as taught by Barrett, in

order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response.

In regard to claim 4, Funakubo discloses (fig. 1) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the stage fast scanning stage comprising, at least one fixed support (19), and a sample stage (17) having at least one axis of translation, the sample stage being connected to at least one actuator element (18), a sine wave generator (fig. 4, 62) for actuating the at least one actuator element, in which the stage is displaced by the at least one actuator element being driven at the frequency of resonant vibrating corresponding to translation of the sample with respect to the probe (page 5, lines 4-10; page 6, lines 1-34; page 7, lines 19-36; page 9, lines 16-28). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to

incorporate the system of Funakubo in an atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. Funakubo in view of Watanabe fails to disclose that the resonant frequency of the microscope is between about 250 Hz and 7.5 kHz. However, Barrett discloses an atomic force microscope with a resonant frequency between about 250 Hz and 7.5 kHz (column 1, lines 15-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the resonant frequency of the microscope of Funakubo in view of Watanabe to be between about 250 Hz and 7.5 kHz as taught by Barrett, in order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response.

In regard to claim 13, Funakubo discloses (fig. 1) a method of operating a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), providing a sample stage (17) having a sample thereon and causing displacement of the sample on the sample stage relative to the probe by actuating at least one actuator element (18) to drive the stage at the resonant frequency of the sample stage using a sine waveform generator (fig. 4, 62) (page 5, lines 4-10; page 6, lines 1-34; page 7, lines 19-36; page 9, lines 16-28). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in

the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption. Funakubo further fails to specify the kind of microscope used in the system. However, Watanabe further discloses using an atomic force microscope to measure the properties of a sample (column 16, lines 14-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the system of Funakubo in an atomic force microscope as taught by Watanabe, in order to maximize imaging resolution. Funakubo in view of Watanabe fails to disclose that the resonant frequency of the microscope is between about 250 Hz and 7.5 kHz. However, Barrett discloses an atomic force microscope with a resonant frequency between about 250 Hz and 7.5 kHz (column 1, lines 15-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the resonant frequency of the microscope of Funakubo in view of Watanabe to be between about 250 Hz and 7.5 kHz as taught by Barrett, in order to choose the a resonant frequency appropriate to the measured sample and desired mechanical response.

Claims 3, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) and Barrett (5210410) as applied to claim 2, and in view of Sarkar (6806991).

In regard claims 3 and 5, Funakubo in view of Watanabe and Barrett discloses (fig. 1) a fast scanning stage wherein the sample stage has a square or rectangular

configuration. Funakubo in view of Watanabe and Barrett fails to disclose four actuator elements at each corner of the sample stage. However, Sarkar discloses (fig. 2) a stage that has a rectangular configuration and that has four actuator elements supporting the stage (203a-d and 201a-d) at each corner of the stage (column 4, lines 10-49). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Funakubo in view of Watanabe and Barrett by placing an actuator at each corner of the stage in order to enhance the stability of the stage.

In regard to claim 6, Funakubo in view of Watanabe, Barrett, and Sarkar discloses that the actuator elements form a parallelogram scanning element.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of in view of Watanabe et al. (5371365), Barrett (5210410), and Sarkar (6806991) as applied to claim 6, and in view of Pai et al. (6338249).

In regard to claim 7, Funakubo in view of Watanabe, Barrett, and Sarkar, discloses (fig. 2) multiple actuators that translate the stage in two directions. Funakubo in view of Watanabe, Barrett, and Sarkar remain silent regarding the actuators being electrically in parallel. However, Pai discloses a system using multiple actuators (20) that are electrically in parallel to move a single element (110) (column 3, lines 5-10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to put the actuators electrically in parallel in order to control the actuators independent from each other.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) and Barrett (5210410) as applied to claim 2, and in view of Erlings (US RE37560).

Regarding claim 8, Funakubo in view of Watanabe and Barrett discloses a translational stage displaced by piezoelectric stack actuators (page 6, lines 21-25). Funakubo in view of Watanabe and Barrett remains silent regarding the actuator being a stack-bending element. However, Erlings teaches that piezoelectric stacks are commonly used in displacing a stage for a scanning microscope (column 1, lines 17-30). It would have been obvious to one of regular skill in the art at the time the invention was made to include the stack actuators of Erlings to the translational stage of Funakubo in view of Watanabe and Barrett to actuate larger displacements.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) and Barrett (5210410) as applied to claims 2 and 3, and in view of Zdeblick (US 4906840).

Regarding claims 9 and 10, Funakubo in view of Watanabe and Barrett discloses a stage moveable by at least one piezoelectric stack actuator (page 6, lines 21-25). Funakubo in view of Watanabe and Barrett is silent regarding a pzt bimorph actuator. However, Zdeblick discloses a pzt bimorph actuator (cantilever, fig 9) that actuates the tip of a probe (column 2, lines 43-48). It would have been obvious to one of regular skill in the art at the time the invention was made to include the pzt bimorph actuator of

Zbedlick to the stage of Funakubo in view of Watanabe and Barrett to apply the precise movement of Zbedick's probe to the motion of the stage.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) and Barrett (5210410) as applied to claim 1, and in view of Marchman (US 5811796).

Regarding claim 11, Funakubo in view of Watanabe and Barrett discloses (fig. 1) a scanning probe microscope with a moveable stage. Funakubo in view of Watanabe and Barrett remains silent regarding the material of the stage. However, Marchman discloses a scanning microscope including a probe (column 5, line 22), and a stage (27) having at least one axis of translation and means for causing displacement of the stage relative to the probe (column 5, lines 57-column 6 line 24). Marchman further discloses the stage (disc, 27)) being made out of a ceramic material (fig 2A, column 6, lines 32-37). It would have been obvious to one of regular skill in the art at the time the invention was made to make the stage of Funakubo in view of Watanabe and Barrett out of ceramic material in order to inexpensively produce a durable stage.

Claim 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) and Barrett (5210410) as applied to claim 13, and in view of the publication of Ando et al (A High-Speed Atomic Force Microscope for studying biological macromolecules).

Regarding claim 15, Funakubo in view of Watanabe and Barrett discloses a stage that is displaced at a resonant frequency. Funakubo in view of Watanabe and Barrett is silent regarding the stage having a resonant frequency at 1/100th of the probe's frequency. Ando teaches the actuator of a scanner having a resonant frequency at 8.5 kHz, 34 kHz, and 100 kHz (paragraph entitled: Imaging Bandwidth). Ando further discloses the probe having a resonant frequency of 2.5 MHz (paragraph entitled: Discussion). This range provided for the ratio of frequencies is provides about 1/100th. It would have been obvious to one of regular skill in the art at the time the invention was made to actuate the stage and probe of Funakubo in view of Watanabe and Barrett in a relationship taught by Ando to increase the imaging bandwidth.

Response to Arguments

Applicant's arguments with respect to claims 1-13 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Livedalen whose telephone number is (571) 272-2715. The examiner can normally be reached on 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

THANH X. LUU
PRIMARY EXAMINER

bjl